1023-166 Novel use of Dual Isotope Gated SPECT Imaging With Low- and High Dose Dobutamine Stress for Characterization of Stunned, Hibernating, Remodeled and Non-viable Myocardium

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Background: In a novel scintigraphic design, rest-redistribution TL-201 imaging was combined with low and high-dose dobutamine (LD or HD-Dob) stress gated (G) SPECT for the assessment of viability.

Methods: After rest-redistribution TL, 54 patients of coronary artery disease (LVEF < 45%) received HD-Dob (40 μg/kg/min) and Tc-99m sestamibi GSPECT at 1H provided HD-Dob stress perfusion but resting wall motion (WM). LD-Dob (5 μg/kg/min) was given again to estimate contractile reserve (CR).

Results: Perfusion and WM were assessed in 1080 myocardial segments (segs). Normal, mild-moderate (MM) and severe rest TL abnormality were seen in 52, 25 and 23% segs with redistribution in 15%. Dob-stress unmasked ischemia (Isch) in additional 21% segs.

Of 1080 segs, 584 (54%) demonstrated severe WM abnormality. 239 of 584 (41%) segs had normal rest TL, of which 88 segs (37%) showed worsening of Isch at HD-Dob *(stunned segs)* while 155 segs (63%) did not show worsened Isch *(remodeled myocardium)*. Of 584 segs, 140 (24%) with reversible rest TL defects were considered *hibernating*; 91 segs had worse HD-Dob Isch. 131 of 584 segs (22%) had severe-fixed (SF) TL defect and represented *non-viable myocardium* and remaining 74 segs had MMF defect. CR was observed in 83% of stunned, 59% of hibernating and in a third of remodeled segs and segs with MMF, SF defects ($p < 0.01$).

Conclusions: Rest-redistribution TL with LD/HD-Dob stress GSPECT allows precise registration of myocardial perfusion and function and assessment of contractile reserve. CR is more frequently seen in stunned than hibernating myocardium.

1024 Aortic and Peripheral Arterial Diseases

Sunday, March 29, 1998, 5:00 p.m.–7:00 p.m.
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1024-71 Practice Variations in Utilization of Diagnostic Techniques to Evaluate Acute Aortic Dissection – Results From the International Registry of Aortic Dissection (IRAD)

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Background: Multiple imaging modalities are currently available to confirm diagnosis of acute aortic dissection. Each modality has certain advantages and disadvantages with respect to accuracy, speed, convenience, risk and cost. Recently, studies have argued that TEE and MRI should emerge as the most expeditious (TEE) and accurate (MRI) tools for this purpose.

Methods and Results: One hundred and seventy five patients (pts) with a diagnosis of acute aortic dissection in 1996, defined as onset less than 14 days, were enrolled in an international registry involving 10 centers. 107 (61.1%) pts were type A and 68 (38.9%) pts were type B. 13 (7.4%) pts had no imaging study. 59 (33.7%) pts had a single study while the remaining 103 (58.9%) pts had more than one study. CT was the first technique utilized in 96 (54.9%) pts and was not utilized in 60 (34.3%) pts of study group. TEE was the first technique in 53 (30.3%) pts, second technique in 53 (30.3%) pts, and was not utilized in 60 (36%) pts. MRI was used in only 23 (13.1%) pts, mainly as second and third choice investigation. Aortography was used in only 49 (28%) pts, primarily as second and third choice study and was not used in 126 (72%) pts. CT was used as the first choice of study in European centers as compared to US centers, 57.6% vs 43.3%, whereas TEE was used more readily as the first choice in US vs Europe, 36.6% vs 28.2%. The overall number of imaging studies were similar in both groups. A major Japanese center had a high preference for CT as the first choice (83.3%), whereas TEE was rarely used (30.8%).

Conclusions: 1. CT is currently the preferred initial choice of imaging modality for acute aortic dissection, perhaps because of its wide availability. 2. Aortography use has declined substantially; it can no longer be considered the gold standard test. 3. Interesting regional variations exist in utilization of imaging techniques for acute aortic dissection. Their implications on cost and outcomes will be the subject of future evaluations.

1024-72 The "pathology" of Renal Artery Stenosis: An Intravascular Ultrasound Study

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To better understand the pathology of renal artery stenosis, we used pre-intervention intravascular ultrasound (IVUS) to study 58 atherosclerotic renal artery lesions (49 ostial, 9 nonostial) in 36 pts undergoing stent implantation for renovascular hypertension. Measurements included reference and lesion arterial, lumen, and plaque (artery - lumen) areas (mm^2), arc of calcium (Ca, in degrees), and plaque burden (plaque/arterial area). The lesion arterial area was compared to the reference; negative remodeling was defined as lesion < reference arterial area.

	Ostial	Nonostial	p
Reference arterial area	30.8 ± 10.2	35.4 ± 15.0	0.2900
Reference lumen area	22.8 ± 7.5	25.9 ± 12.7	0.3518
Reference plaque area	7.0 ± 3.9	9.5 ± 3.2	0.3043
Reference plaque burden	26 ± 7	29 ± 9	0.2971
Lesion arterial area	21.8 ± 10.6	24.4 ± 6.9	0.5453
Lesion lumen area	4.9 ± 5.5	7.4 ± 4.5	0.1324
Lesion plaque area	16.3 ± 9.3	16.5 ± 6.9	0.9605
Lesion Ca	111 ± 106°	21 ± 58°	0.0254
Negative remodeling	94%	71%	0.0779

We Conclude: Renal artery stenosis is distinctly difference from coronary artery disease. In renal artery stenosis, pre-intervention IVUS shows that (1) reference plaque burden is modest (26 ± 7% overall), (2) negative remodeling contributes importantly to lumen compromise in both ostial and nonostial lesions (90% overall), and (3) calcium is significant in ostial lesions. These findings may explain the suboptimal results (recoil and/or dissection) when ostial renal artery stenosis is treated with PTA alone.

1024-73 3-Dimensional Ultrasound of Carotid Artery Before and After Endarterectomy: Quantitative Analysis in Comparison With Angiography and Clinical Implications

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Three-dimensional ultrasound (3DU) yields a volumetric data set of the carotid artery (CA).

Purpose: To explore the qualitative and quantitative potential of 3DU in examination of CA lesions and in evaluation of surgical intervention.

Methods: 3DU was performed for both left and right CA in 12 pts (41–77 yrs) before and after endarterectomy (EAT) using a prototype 3DU fast acquisition system in a fan-like scanning format. 3DU of CA was analyzed to obtain: 1) site of stenosis (S), 2) length, volume, and morphology of plaques (P), 3) % of S by both diameter and cross-sectional area methods and 4) Cross-sectional area change after EAT. Selective angiography (A) of the CA was performed before surgery to obtain the site and % of S.

Results: In 12 pts, significant S (70–100%) (89 ± 11.3%) were found in 15 vessels by CAA located in internal (12), external (1) and at the bifurcation extending from common to internal (2) CA. All the stenosis were located by 3DU and the measurements ranged from 57–100% (82 ± 15.8%) using diameter method and 72–100 (91 ± 8.5%) using cross-sectional area method. (M ± SD difference = 2.9 ± 7%). P measured by 3DU ranged from 2.5–29 (17 ± 9) mm in length and 0.02–2.1 (0.8 ± 0.6) ml in volume. Most of the P were eccentric. 2/4/7 were calcified/non-calcified/mixed. Cross-sectional area of 12 operated CA changed from 6.4 ± 6.3 mm^2 to 50.6 ± 18.8 mm^2 by EAT. Intra- and inter-observer variabilities for all the measurements were less than 10%.

Conclusions: 1. 3DU provides incremental information about CA and stenotic lesions both qualitatively and quantitatively. 2. The ability of 3DU in volume quantification could be useful in clinical study of CA P progression or regression and in evaluation of therapeutic interventions.

1024-74 Renal Artery Stenosis Stent Revascularization of 587 Patients: 4 Year Effect Upon Blood Pressure Control, Serum Creatinine, and Survival

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Aim: Data on 587 successful patients (pts) (50% male, age 70 ± 9 yrs) within the Renal Artery Stenosis (RAS) Palmaz™ Stent Revascularization (SR) Multicenter Registry were analyzed to assess SR's effect upon blood pressure (BP) control, and survival; pts were stratified so as to assess whether baseline creatinine (Cr) influenced survival.

Time (± 1 mos)	1 Yr	2 Yr	3 Yr	4 Yr
Systolic BP (mmHg)	147 ± 24*	145 ± 19*	144 ± 20*	140 ± 20*
Diastolic BP (mmHg)	75 ± 13*	76 ± 10*	76 ± 12*	70 ± 12*
#anti BP Meds	1.7 ± 0.9*	1.8 ± 0.9*	1.7 ± 0.9*	1.9 ± 1.0
Survival entire group	91 ± 9%	84 ± 16%	79 ± 21%*	72 ± 28*
Cr ≤1.9 mg/dl	97 ± 2%	90 ± 1%	80 ± 4%	86 ± 11%*
Cr >2.0 mg/dl	86 ± 2%	72 ± 3%	64 ± 0%	40 ± 0%*

*p < 0.05, ** few deaths were related to end-stage renal disease

Conclusion: Successful SR for RAS demonstrated a significant decrease in systolic and diastolic BP's, and the number of antihypertensive drugs required to control the BP. An elevated baseline Cr adversely influenced survival. These renal artery stenoses should be vigorously looked for, and treated with SR before renal dysfunction occurs.

1024-75 Primary Stent Deployment for Obstructive Lesions of the Subclavian or Innominate Artery

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Obstructive lesions of the innominate or subclavian artery can result in arm claudication, symptoms of subclavian steal, or symptoms related to diminished flow down an internal mammary artery bypass graft (coronary-subclavian steal). To evaluate the role of primary stenting for the treatment of this condition, we performed 30 primary stent procedures in 30 patients (10 males, 62 ± 10 years) with stenosis (24/30) or occlusion (6/30) of the innominate or subclavian artery. All procedures were performed with the Palmaz medium tubular slotted stent. The primary indication for the procedure was arm claudication in 5 (17%), subclavian steal syndrome in 9 (30%), myocardial ischemia in 15 (50%), and need to gain access for another procedure in 1 (3%). Technical success was achieved in 29 (97%) procedures. There was one failure due to inability to cross a chronic total occlusion of the innominate artery with a guidewire.

	Baseline	Final	p
Reference diameter (mm)	7.01 ± 1.50	6.92 ± 1.23	NS
Minimal lumen diameter (mm)	1.94 ± 0.98	6.25 ± 1.35	< 0.0001
% Diameter stenosis	67.7 ± 15.3	9.9 ± 10.1	< 0.0001

Mean systolic pressure difference between the upper extremities was 38.4 ± 18.9 mm Hg pre and 0.7 ± 2.7 mm Hg (p < 0.0001) immediately post stenting. There were no major complications (death, MI, stroke). One patient (3%) required surgical repair of the brachial artery after using this approach to recanalize an occluded subclavian artery.

In Conclusion: 1) Primary stenting of the subclavian or innominate artery is safe and effective with excellent acute angiographic and hemodynamic results. 2) Cerebral or distal embolization did not occur even when treating subclavian occlusions 3) Long term studies are required to evaluate the durability of this technique.

1024-76 Spontaneous Aortic Rupture: A Not-So-Rare Cause of Sudden Death in Young People

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Among 269 consecutive cases of juvenile sudden death (≤35 years) collected in the time interval 1979–1996, 13 (5%) had a mechanical cardiac arrest due to aortic rupture. They consisted of 2 mycotic aneurysms, 1 "parchment-like" aorta and 10 dissecting aneurysms. The latter, all males, aged 17 to 35 years (mean 26.3), presented the following risk factors, which are all congenital in nature: isolated isthmal coarctation in 2, Marfan syndrome in 2, isthmal coarctation associated with bicuspid aortic valve (BAV) in 2, and isolated and normally functioning BAV in 4. Histology of the dissected aortic wall showed equally severe degenerative changes consisting of elastic fragmentation and cystic medial necrosis. Further, a review of our anatomical collection of aortic dissection in the general population disclosed a 12% frequency of BAV; considering that the frequency of BAV in normal people is nearly 1%, the association between BAV and aortic dissection does not appear casual (p < 0.001).

In Conclusion: a) spontaneous aortic rupture is a not-so-rare cause of sudden death in the young (5%); b) in this subset of population risk factors are represented by congenital structural defects present since birth; c) the natural history of BAV entails the risk of spontaneous aortic laceration and sudden death, either in the isolated form or in association with isthmal coarctation; d) under these circumstances the aortic tunica media shows an intrinsic structural weakness very similar to that observed in Marfan syndrome, such as to suggest a congenital, most probably genetic defect; e) echo monitoring of the aortic root should be recommended in subjects with BAV; f) familial and molecular genetic investigations are needed to settle the question.

1025 P Wave Signal Averaging by Body Surface Mapping

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1025-89 Body Surface Mapping During Left Atrial Pace Mapping: Evaluation of Spatial Differences in P-Wave Configuration

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Background: Use of the P wave morphology to identify the origin of atrial tachycardia prior to catheter ablation has been of limited clinical value due to the low resolution of the standard 12-lead ECG. The aim of this study was to assess the performance of body surface P wave mapping in localizing left atrial ectopic activity.

Methods: 62-lead ECG mapping was carried out during transseptal left atrial pacing at up to 7 endocardial sites in 5 patients without structural heart disease. Echocardiography confirmed normal biatrial size and morphology. Bipolar pacing was performed at long cycle lengths to achieve atrial capture after previous T-U wave offset. Biplane fluoroscopy and intracardiac echocardiography were used for guidance of catheter positioning and to relate each catheter location to the left atrial anatomy. A P wave integral map was computed for every particular ectopic atrial activation sequence. Morphologic variation in the P wave integral maps was visually determined for each patient by examining spatial differences in the location of the extremes and the contour of the zero line.

Results: Left atrial sites where pacing was conducted included all 4 pulmonary veins, the left atrial appendage, the interatrial septum, the anterolateral wall, and the mitral annulus. The P wave integral maps all demonstrated dipolar voltage distributions. Distinct spatial differences among the P wave integral map patterns were observed at a mean of 5.0 ± 1.4 left atrial sites per patient (range 4 to 7 sites per patient).

Conclusions: These preliminary data show that a spatial surface map representation of the P wave morphology enables identification of various sites of ectopic left atrial impulse formation. Clinical application of body surface mapping may lead to improved electrocardiographic localization and noninvasive recognition of leftsided atrial tachycardia foci prior to ablative therapy.

1025-90 Detection of Concealed Accessory Atrioventricular Pathway by P-Wave Signal-averaged Electrocardiogram

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Background: It is difficult to differentiate atrioventricular reciprocating tachycardia (AVRT) due to the accessory atrioventricular pathway (AP) from atrioventricular nodal reentrant tachycardia (AVNRT) when the ventricular preexcitation is absent on standard ECG. Electrophysiological studies (EPS) have demonstrated the anterograde conduction in the concealed AP is blocked near the AP-ventricular interface during sinus rhythm. We examined whether P wave signal-averaged electrocardiogram (P-SAECG) is useful to detect the concealed AP.

Methods and Results: P-SAECG during normal sinus rhythm was performed in 20 normal volunteers (control), 17 patients with AVRT due to the concealed AP, 15 with AVNRT, and 22 with a paroxysmal atrial fibrillation (Paf). The presence of the anterograde conduction in the concealed AP was confirmed in all cases by EPS. The filtered P wave duration (fPd) by the time domain analysis was significantly prolonged in patients with AVRT (131 ± 8 ms) compared to controls (119 ± 4 ms) and patients with AVNRT (118 ± 5 ms) (p < 0.05). Although the fPd was similar between AVRT and Paf (134 ± 8 ms), AR20 (power spectrum area ratio of 0–20 to 20–100 Hz) by the frequency domain analysis differentiated AVRT (1.7 ± 0.6) from Paf (3.2 ± 0.9). Ablation of the concealed AP significantly shortened fPd in patients with AVRT (122 ± 5 ms) (p < 0.0001) but that of the slow pathway did not in those with AVNRT (118 ± 7 ms). The changes in fPd after ablation were significantly correlated with those in the duration of atrial activity at the ablation site detected by EPS (r = 0.69, p < 0.01).

Conclusions: Our data suggest that P-SAECG is useful to detect the concealed AP, and may provide a new concept of the presence of anterograde